



Mark Scheme (Results)

Summer 2017

Pearson Edexcel International GCSE
in Human Biology (4HB0) Paper 01

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

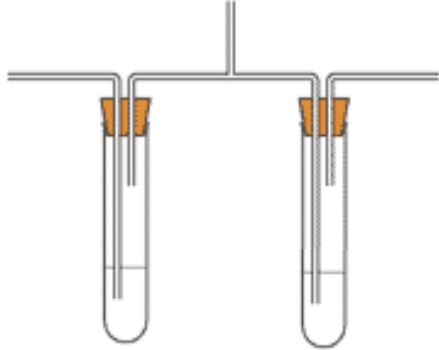
| Question number | Answer | Accept | Reject | Marks |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|-------|
| 1 (a) | <p>B; W and Y</p> <p>The only correct answer is B</p> <p>A is not correct because they are not ligaments</p> <p>C is not correct because they are not ligaments</p> <p>D is not correct because they are not ligaments</p> | | | 1 |
| (b) | <p>B; pituitary gland</p> <p>The only correct answer is B</p> <p>A is not correct because the hormones are not released by this gland</p> <p>C is not correct because the hormones are not released by this gland</p> <p>D is not correct because the hormones are not released by this gland</p> | | | 1 |

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|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|
| (c) | <p>A; 0.62%</p> <p>The only correct answer is A</p> <p>B is not correct because the calculation does not produce this figure</p> <p>C is not correct because the calculation does not produce this figure</p> <p>D is not correct because the calculation does not produce this figure</p> | | | 1 |
| (d) | <p>D; vaccinations</p> <p>The only correct answer is D</p> <p>A is not correct because it is not involved in catching disease</p> <p>B is not correct because it is not involved in catching disease</p> <p>C is not correct because it is not involved in catching disease</p> | | | 1 |

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|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|
| (e) | <p>C: carbon dioxide + water \longrightarrow glucose + oxygen</p> <p>The only correct answer is C</p> <p>A is not correct because carbon dioxide and water are not used</p> <p>B is not correct because carbon dioxide and water are not used</p> <p>D is not correct because carbon dioxide and water are not used</p> | | | 1 |
| (f) | <p>C: receptor \longrightarrow sensory neurone \longrightarrow relay neurone \longrightarrow motor neurone \longrightarrow effector</p> <p>The only correct answer is C</p> <p>A is not correct because the impulse does not pass to the receptor and sensory neurone initially</p> <p>B is not correct because the impulse does not pass to the receptor and sensory neurone initially</p> <p>D is not correct because the impulse does not pass to the receptor and sensory neurone initially</p> | | | 1 |

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|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|---|
| (g) | <p>A; It results in a higher than normal level of disease in a certain area.</p> <p>The only correct answer is A</p> <p>B is not correct because it does not make reference to higher level of disease</p> <p>C is not correct because it does not make reference to higher level of disease</p> <p>D is not correct because it does not make reference to higher level of disease</p> | | | 1 |
| (h) | <p>B; Q and R</p> <p>The only correct answer is B</p> <p>A is not correct because both bones are not part of the axial skeleton</p> <p>C is not correct because both bones are not part of the axial skeleton</p> <p>D is not correct because both bones are not part of the axial skeleton</p> | | | 1 |

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|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|----------|
| (i) | D; ultraviolet light from the Sun The only correct answer is D A is not correct because it is not a mutagen B is not correct because it is not a mutagen C is not correct because it is not a mutagen | | | 1 |
| (j) | C; skin The only correct answer is C A is not correct because it is not an excretory organ B is not correct because it is not an excretory organ D is not correct because it is not an excretory organ | | | 1 |
| | | | | Total 10 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------|----------|
| 2 (a) | <ul style="list-style-type: none"> • test tubes correct way round (alternate long/short or vice versa); • mouth piece correctly attached to each delivery tube; • long tubes in the limewater;  | | | 3 |
| 2 | (b) | Accept hydrogencarbonate/bicarbonate indicator | | 1 |
| | (c) | Accept pipette/syringe | | 1 |
| | (d) | Hydrogencarbonate goes yellow; | | 3 |
| | (e) | Ignore references to temperature ORA | | 2 |
| | | | | Total 10 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|---------------------------------------------------------------|-------|
| 3 (a) (i) | <ul style="list-style-type: none"> more energy in chicken nuggets; 55 kJ (per 100 g); | ORA | Reject produces energy | 2 |
| (ii) | <ul style="list-style-type: none"> chips; contains more fat/more energy/more calories/kJ; manipulation of data e.g. 20 g per 100 g more than chicken nuggets fat stored in the body; energy/calorie/kJ intake exceeds demand; | | Reject produce more energy Ignore values quoted from table | 4 max |
| (b) (i) | <ul style="list-style-type: none"> calcium required for bones / development of bones/skeletal system of fetus; maintain teeth/bone density/strength of pregnant woman; | References to reducing risk of osteoporosis | | 2 |
| (ii) | line labelling the placenta; placenta; OR line labelling to the cervix; cervical plug; | | | 2 |

| | | | | | | | | | | | | |
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| | OR line labelling amnion; amnion | | | | | | | | | | | |
| (c) | <table border="1"><tr><td>is easily digestible</td><td>✓</td></tr><tr><td>contains no cholesterol</td><td></td></tr><tr><td>contains antibodies</td><td>✓</td></tr><tr><td>contains no fat</td><td></td></tr></table> | is easily digestible | ✓ | contains no cholesterol | | contains antibodies | ✓ | contains no fat | | | | 2 |
| is easily digestible | ✓ | | | | | | | | | | | |
| contains no cholesterol | | | | | | | | | | | | |
| contains antibodies | ✓ | | | | | | | | | | | |
| contains no fat | | | | | | | | | | | | |
| | | | | Total 12 | | | | | | | | |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------|---------|
| 4 (a) | <ul style="list-style-type: none"> (solution A) 80 °C; (solution B) 40 °C | | | 2 |
| (b) | <ul style="list-style-type: none"> time/how long; for blue-black colour to disappear/turn orange; | Accept colour change | | 2 |
| (c) | <ul style="list-style-type: none"> carbohydrase/amylase/enzyme breaks down starch / carbohydrate; to glucose/maltose; | Allow sugar | | 2 |
| (d) | <ul style="list-style-type: none"> optimum pH for amylase/carbohydrase is 7 / neutral / pH too low/acidic; carbohydrase/amylase would denature; reference to change in active site/no enzyme-complex formed; | Allow 7.5/slightly alkaline | | 2 |
| (e) | <ul style="list-style-type: none"> volume/concentration of solutions (A/B) / carbohydrase / amylase / starch/carbohydrate; stirring/non-stirring; | Accept amount | | 1 |
| | | | | Total 9 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------|-------|
| 5 (a) (i) | <ul style="list-style-type: none"> • 60 – 40; • 20;; | Incorrect values from graph in a subtraction but correct answer to their calculation = 1 mark | | 2 max |
| | (ii) <ul style="list-style-type: none"> • more men than women die from lung cancer overall; • steeper rise in deaths from lung cancer in men (between 1930 and 1990) • drop in lung cancer deaths in males from 1990 whereas slight increase/remains stable in women; | Allow reverse argument for females for all marking points | | 2 max |
| (b) (i) | <ul style="list-style-type: none"> • tar; | Allow correct named chemical eg benzene | | 1 |
| | (ii) <ul style="list-style-type: none"> • evidence collected over time; • from a large group of people; • made up from smokers and non-smokers; • data compared; • variables/named variables kept constant; | | | 3 max |
| | (iii) <ul style="list-style-type: none"> • carbon monoxide binds to red blood cells / haemoglobin; • reduces the amount of oxygen in the blood; • fetus receive less oxygen; • less aerobic respiration/less energy; • for growth of baby; | | | 2 |

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|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|-----------------------|
| (c) | <ul style="list-style-type: none">• alveoli/air sacs damaged/alveoli fuse;• less surface area (in lungs);• for gas exchange/oxygen diffusion;• reference to less oxygen in blood;• build up of carbon dioxide in blood;• less energy/aerobic respiration; | Accept alveoli join together | | 3 max Total 13 |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|--|-----------------------|

| Question number | Answer | Accept | Reject | Marks |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|--------|----------|
| 6 (a) (i) | W cornea; X pupil; Y iris; | | | 3 |
| (ii) | In either order: <ul style="list-style-type: none"> • cornea • lens | Allow W and Z in either order | | 2 |
| (iii) | <ul style="list-style-type: none"> • ciliary muscle relaxed; • suspensory ligaments taught/stretched; • lens shape less curved/thinner/flatter; | Reject radial/circular muscles | | 3 |
| (b) | <ul style="list-style-type: none"> • avoid touching eyes; • clean/wash hands; • avoid sharing towels/use clean towels/pillows/face creams/makeup/eye medication/eye glasses; • use medication/eye drops; • do not use swimming pools; | | | 2 max |
| (c) (i) | In the following order: <ul style="list-style-type: none"> • sticks bacterium to cells/protection; • allows substances to exit/enter cells; • provides support/shape to cell/prevents cell lysis/bursting; • movement; | | | 4 |
| (ii) | <ul style="list-style-type: none"> • antibiotics/named antibiotic; | | | 1 |
| | | | | Total 15 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------|----------|
| 7 (a) (i) | <ul style="list-style-type: none"> • (solution) B; • water moves out of red blood cell; • by osmosis; • red blood cell shrivelled/shrinks/gets smaller; | | | 3 max |
| (ii) | <ul style="list-style-type: none"> • solution C; • same concentration as the solution inside red blood cells; • movement of water in both directions equal; • reference to maintaining health/viability/shape of red blood cells; | | | 3 max |
| (b) | <p>In the following order:</p> <ul style="list-style-type: none"> • platelets; • red blood cells; • agglutinate; • antigens; • antibodies; • white blood cells; | | | 6 |
| | | | | Total 12 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|---------|
| 8 (a) | <ul style="list-style-type: none"> decreases/declines/falls/drops; | Remains fairly constant | | 1 |
| (b) | <ul style="list-style-type: none"> greenhouse gas; contributes to global warming/greenhouse effect; leading to climate change/rise in sea levels/flooding | Allow other valid consequence of global warming | | 2 |
| (c) | <ul style="list-style-type: none"> more fossil fuels burned/greater number of large industries set up; | | | 1 |
| (d) | <ul style="list-style-type: none"> 118 000 / 2000 000; ×100; 5.9%; | <p>Incorrect values from graph in a division calculation and multiplied by 100 but correct answer to their calculation = 2 marks</p> <p>Allow 6%</p> | | 3 |
| (e) | <ul style="list-style-type: none"> acid rain; acidification of waterways/soil; death of aquatic life/plants/fish/coral/increase in lung diseases/named example/damages lungs / erosion of buildings/damages leaves/reduces photosynthesis; | | | 2 max |
| | | | | Total 9 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|--------------------|-------|
| 9 (a) | (i) • 0 – 1/1 ½ years; | | | 1 |
| | (ii) • height/mass/weight/head circumference; | | | 1 |
| | (iii) • 10 (years) | | | 1 |
| | (iv) • production of reproductive hormones/growth hormones; • during puberty; | | | 2 |
| | (v) • development of body hair; • voice deepens/ larynx enlarges ; • height increase/muscle development/broaden shoulders; • growth of sex organs/named sex organ; • production of sperm/testosterone/erectons; | | | 2 max |
| (b) | Two from Oestrogen: • repair/thickening of uterus lining (following menstruation); • inhibition of FSH; • influences LH production; AND | | Reject uterus wall | 2 max |

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| | | progesterone: <ul style="list-style-type: none">• suppress levels of FSH/LH;• maintains thickness of uterus lining; | | | 2 |
| 9 | (c) | (i) | <ul style="list-style-type: none">• stimulate a follicle/egg to develop/helps to increase number of eggs that mature | | 1 |
| | | (ii) | <ul style="list-style-type: none">• pituitary (gland) | | 1 |
| | | (iii) | <ul style="list-style-type: none">• causes ovulation/encourages (more) eggs to be released;• from the ovary; | | 2 |
| | | | | | Total 15 |

| Question number | Answer | Accept | Reject | Marks |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------------------------------|-------|
| 10 (a) (i) | <p>D; two recessive alleles</p> <p>The only correct answer is D</p> <p>A is not correct because it would not give the correct phenotype</p> <p>B is not correct because it would not give the correct phenotype</p> <p>C is not correct because it would not give the correct phenotype</p> | | | 1 |
| (ii) | <ul style="list-style-type: none"> • (person 3) Tt/tT/heterozygous; • (person 8) tt/homozygous recessive; | | | 2 |
| (iii) | <ul style="list-style-type: none"> • two/some children have Tay-Sachs; • each have inherited 2 recessive alleles/each child is homozygous recessive; • one faulty allele from person 3/from each parent; • both parents (3 and 4) are heterozygous/carriers/Tt; • person 3 can't be TT/homozygous dominant because no children would have Tay-Sachs; | | | 3 max |
| (iv) | <ul style="list-style-type: none"> • parental genotypes Tt and tt; • parental gametes T t t t; • offspring genotypes Tt Tt tt tt; | <p>Reject mp1 if sex chromosomes are included</p> <p>Ecf from mp2 onwards;</p> | <p>Reject answers not using T and t for alleles.</p> | 5 |

| | | | | |
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| (b) | <ul style="list-style-type: none"> • offspring phenotypes normal, normal, Tay-Sachs, Tay-Sachs; • 1:1/50%/1 in 2/ ½ ; • loss of muscle mass/movement/coordination/loss of balance/muscle cramp/spasms/weakened muscles/slow reactions; • paralysis; • loss of vision; • slurred speech; | ignore sex chromosomes if given | | 2 max |
| (c) | <ul style="list-style-type: none"> • (gene) mutation; • Insertion of bases/bases/T/A/C have been added; • (leading to) order of bases changed; | Allow frameshift | | 2 max Total 15 |

Total for paper 120 marks

